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10/816,317	04/01/2004	Andrew C. Gallagher	87803RLO	9124

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EXAMINER	
REDDING, THOMAS M	

ART UNIT	PAPER NUMBER
2609	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/816,317	GALLAGHER, ANDREW C.	
	Examiner	Art Unit	
	Thomas M. Redding	2609	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-9 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-9 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 01 April 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 8/26/05, 4/1/04.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities: The Brief Description of the Drawings refers to figure 12 (page 3, line 28). The drawings only have 11 figures and no reference is made to figure 11 in the Brief Description of the Drawings. It appears that the sentence in the specification actually is referring to figure 11 and will be assumed as such for the remainder of this action.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-4 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kotlikov et al. (US 2003/0012453 A1) in combination with Shimazu et al. (US005724454A).

Regarding claim 1, Kotlikov teaches [a] method of detecting thin occlusion pixels in a digital image, comprising:

identifying pixels from the digital color image representing one or more background/non-object regions ("classification of image data into object and non-object regions", Kotlikov, paragraph 25, line 2);

detecting pixels representing object regions in the background/non-object regions ("non-object regions", Kotlikov, paragraph 25, line 3); and

using the detected non-object pixels to replace the object pixels ("amending the object data to more closely resemble the data of non-object regions", Kotlikov, paragraph 24, line 1).

While Kotlikov describes the objects to be replaced as a "scratch or other defect in the image" at paragraph 005, Kotlikov does not expressly teach that his non-object regions are sky regions and his object regions are hanging wire regions.

Shimazu, working the same field of endeavor of color image correction, does describe replacing hanging wire pixels in sky regions ("elimination of a undesirable image area in an image, for example, an electric wire running across the blue sky", Shimazu, column 26, line 2.

It would have been obvious at the time the invention was made to one of ordinary skill in the art to use the defect removal method of Kotlikov to solve the problem identified by Shimazu of removing the electric wire running across the blue sky in order to effect the "elimination of a undesirable image area in an image" (Shimazu, column 26, line 2).

Regarding claim 2, the Kotlikov-Shimazu combination teaches the elements common with claim 1 as described above. It also teaches developing a model based on the identified sky pixels, wherein such model is a mathematical function that has inputs of pixel position and outputs of color ("the pixel may be replaced by the average or weighted average of pixels in its neighborhood", Kotlikov, paragraph 50, line 3; and

using the model to operate on the digital color image to replace the values of pixels from the sky occlusion regions with values predicted by the model ("the pixel may be replaced by the average or weighted average of pixels in its neighborhood", Kotlikov, paragraph 50, line 2).

Regarding claim 3, the Kotlikov-Shimazu combination teaches all the elements of claim 2 and further teaches wherein the model is a two-dimensional polynomial of the pixel position in the digital color image ("The defect may also be removed by interpolation such as with linear interpolation or quadratic interpolation", Kotlikov, paragraph 50, line 16).

Regarding claim 4, the Kotlikov-Shimazu combination teaches [t]he method of claim 3 wherein the polynomial is a second-order polynomial ("The defect may also be removed by interpolation such as with linear interpolation or quadratic interpolation", Kotlikov, paragraph 50, line 16).

Regarding claim 9, the Kotlikov-Shimazu combination teaches [a] method of removing hanging wire region pixels from detected sky regions in a digital color image having pixels, the method comprising:

All the elements that are common with claim 1 are described in the claim 1 section above. It also teaches: developing a model based on the identified sky pixels, wherein such model is a mathematical function that has inputs of pixel position and

outputs of color ("the pixel may be replaced by the average or weighted average of pixels in its neighborhood", Kotlikov, paragraph 50, line 3; and using the model to operate on the digital color image to replace the values of digital color image pixels associated with the hanging wire regions with values predicted by the model to thereby remove the hanging wire region pixels ("the pixel may be replaced by the average or weighted average of pixels in its neighborhood", Kotlikov, paragraph 50, line 3).

4. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kotlikov et al. (US 20030012453 A1) and Shimazu et al. (US005724454A) in combination with Luo et al. (US 20030053686A1).

Regarding claim 5, the Kotlikov Shimazu combination teaches all the elements that are in common with claims 1 and 2.

The Kotlikov-Shimazu combination does not teach (iii) using the model to operate on the digital color image to classify additional pixels not included in the initial sky region as sky.

Luo, working in a similar problem solving area of color image segmentation, does teach using the model to operate on the digital color image to classify additional pixels not included in the initial sky region as sky ("an inventive region growing process is used to fill in holes and extend boundaries of the candidate cloudy sky regions." Luo '686, paragraph 36).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to further combine the combination of Kotlikov and Shimazu with

the region growing technique of Luo'686 in order to deal with regions where " 'marginal' pixels may have sky-color and texture belief values that barely fail the global threshold but are close enough to the belief values of the neighboring pixels that have passed the initial global threshold", Luo'686, paragraph 36.

5. Claims 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Luo (US 20030152289A1) and Miceli et al. (US 20030128149A1).

Regarding claim 7, Luo teaches [a] method of determining the orientation of a digital color image ("a method for determining the orientation of an image", Luo'289, paragraph 1) having pixels, the method comprising: identifying pixels from the digital color image representing one or more sky regions (Luo'289, Fig. 1, reference 221); detecting one or more non-sky regions by examining the sky regions (Luo'289, Fig. 7, "Other subject matters"); and analyzing the non-sky regions to determine the orientation of the digital color image (Luo'289, Fig. 7, Orientation from Semantic Object).

Luo'289 does not expressly teach using hanging wire regions to determine image orientation, but he does teach that "image orientation can be determined from a plurality of semantic objects, including human faces, sky, text, sign, grass, snow field, open water, or any other semantic objects that appear frequently in images, have strong orientations by themselves, have orientations strongly correlated with image orientation, and last but not least, can be detected with reasonably high accuracy automatically." (Luo'289, paragraph 28).

Miceli, working in a similar problem solving area of analysis of overhead line geometries, teaches that overhead lines do have a strong orientation ("The simplest features of the geometrical configurations are illustrated with FIG. 1(c), which shows an overhead line 22 suspended between two poles 10. The weight of the overhead line 22 causes it to sag in a characteristic catenary shape, with the maximal sag from the points of suspension occurring midway between the poles 10." Miceli, paragraph 39).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to apply the method of Luo to make use of the features of power lines, in particular including hanging wires with their characteristic catenary sag as described by Miceli, as the basis for a semantic object detector as described by Luo ("... semantic object detectors can be used to produce alternative or additional estimates of the image orientation." Luo, paragraph 25).

Such a modification would have been obvious to one of ordinary skill in the art because power lines are a ubiquitous feature of everyday urban (and even rural) landscapes ("The power-utility-system infrastructure alone in North America includes approximately 150,000,000 wooden pole structures used to support overhead lines." Miceli, paragraph 3). Power lines also have a strong gravitational orientation as described by Miceli, just as the road "signs" and other features described by Luo. That is, Luo states, "Text and signs appear in many pictures, e.g., street scenes, shops, etc. In general, it is unlikely that signs and text are placed sideways or upside down ..." at paragraph 006. In like manner, power lines have a definite orientation with respect to gravity, and it is impossible that they would be hung "up-side-down", making them even

more reliable than road signs. Such a strong gravitational orientation coupled with their prevalence renders a power line a reliable feature for determining orientation. One of ordinary skill and creativity in the art would clearly recognize this, even in the absence of the teaching of Miceli.

Regarding claim 8, the combination of Luo and Miceli teaches [t]he method of claim 7 wherein analyzing the hanging wire regions further comprises: determining the direction of gravity by examining the location of pixels of the hanging wire region with respect to the endpoints of the hanging wire region ("The weight of the overhead line 22 causes it to sag in a characteristic catenary shape, with the maximal sag from the points of suspension occurring midway between the poles 10." Miceli, paragraph 39).

6. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Kotlikov et al. (US 2003/0012453 A1) and Shimazu et al. (US005724454A) in combination with the combination of Luo (US 20030152289A1) and Miceli et al. (US 20030128149A1).

Regarding claim 6, the Kotlikov and Shimazu combination teaches the elements of claim 2 as described above. The combination of Kotlikov and Shimazu does not teach determining when sky occlusion regions are formed by hanging wires and determining the orientation of the image based on the detected hanging wire regions.

The combination of Luo'289 and Miceli does teach determining when sky occlusion regions are formed by hanging wires and determining the orientation of the image based on the detected hanging wire regions (see rejection above for claim 7).

It would have been obvious at the time the invention was made for one of ordinary skill in the art to merge the hanging wire removal technique of the combination of the Kotlikov and Shimazu with the image orientation method of the Luo'289 and Miceli combination in order to avoid mis-oriented images since "it is aggravating if some of the images are displayed upside-down or sideways." (Luo'289, paragraph 3).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas M. Redding whose telephone number is (571) 270-1579. The examiner can normally be reached on Mon - Fri 7:30 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian P. Werner can be reached on (571) 272-7401. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TMR

BRIAN WERNER
SUPERVISORY PATENT EXAMINER